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# Pollution and Physiology of Marine Organisms

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16. ABSTRACT

The article is a

Book Review of: Pollution and Physiology of Marine Organisms. Edited by J. John Vernberg. Academic Press, 1974.

17. KEY WORDS AND DOCUMENT ANALYSIS

| a. DESCRIPTORS | b. IDENTIFIERS/OPEN ENDED TERMS | c. COSATI Field/Group |
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**Pollution and Physiology of Marine Organisms.** *Edited by F. John Vernberg and Winona B. Vernberg. Academic Press, Inc., New York, San Francisco, London, 1974. xiii + 492 p. $18.50.*

The 23 articles comprising this book were originally presented at the 1973 symposium "Effects of Pollution on the Physiological Ecology of Estuarine and Coastal Water Organisms" sponsored jointly by the U.S. Environmental Protection Agency and the University of South Carolina. Since its publication a little more than a year ago this multiauthored volume has become a mainstay of my personal library. Readers may appreciate, as I do, the numerous and disparate research approaches and response parameters employed to evaluate physiological stress. I especially recommend it to biologists and others who are interested in recent advances on effects upon marine and estuarine macrofauna of metals, petroleum, and pesticides. Users will find the book loosely divided into four sections of approximately equal length: Heavy Metals; Pesticides and PCB's; Oil and Dispersants (although no dispersants were ever investigated); and Factor Interaction–Synergistic Effects of Pollutants and Various Environmental Parameters. A single "methods" article, "Spin-Labeling of Living Tissue" (by W. T. Roubal), which accounted for about 3% of the total pagination, constituted an artificial fifth section.

The lengthy (57 pages) and scholarly treatment afforded "Some Biological Concerns in Heavy Metals Pollution" by M. Waldichuk is an auspicious introduction to that section. Other papers therein gauge metals-induced stress using as indicators fish enzymes (E. Jackim), oxygen consumption of bivalves (F. P. Thurberg et al.), renal metabolism of teleosts (J. L. Renfro et al.), and adaptation of polychaetes to sediments with high metal burdens (G. W. Bryan). Inclusion of a modeling paper on zinc cycling in a North Carolina estuary (D. A. Wolfe), although well written, seems inappropriate for a volume emphasizing physiology.

"Implications of Pesticide Residues in the Coastal Environment" by T. W. Duke and D. P. Dumas is a capable state-of-the-art summarization. Momentum is sustained with papers on renal handling of a DDT metabolite by flounder (J. B. Pritchard), behavioral effects of dieldrin in crab (M. L. Klein and J. L. Lincer), osmotic and ionic regulation in methoxychlor-exposed crabs (R. S. Caldwell), histological effects of organophosphates in oysters (M. R. Tripp), and parathion insult on fish chemoreception (H. Kleerekoper). "The Sources, Fates and Effects of Oil in the Seas" (D. G. Ahearn) could not and does not reflect its title in the 5 pages alloted. However, other contributions to this section are excellent. These deal with crude oil or refined petroleum fractions on survival, growth, behavior, and respiration of fish eggs and larvae (J. W. Struhsaker et al.); toxicity, uptake, depuration, and respiration in adult teleosts, bivalves and shrimp (J. W. Anderson et al.); enzyme changes in oysters, shrimp, and mullet (J. R. Heitz et al.); respiration and survival of adult bivalves (A. Dunning and C. W. Major); and uptake and release of hydrocarbons in shellfish (J. J. Stegeman).

The last major section on multiple interaction effects contains the greatest variety of research approaches; all papers are of uniformly high quality. W. B. Vernberg et al. investigate temperature–salinity–metal (mercury or cadmium) interaction effects on crab survival, respiration, tissue residues, and damage effects seen by electron microscope. In that paper the concentrations of Hg (180 μg/liter) and Cd (1000 μg/liter) in some tests were unrealistically high from an environmental viewpoint, but subsequent studies with crab larvae were conducted at more appropriate levels (1.8 μg/liter of Hg; 1.0 μg/liter of Cd). Others evaluate polychlorinated biphenyl–salinity interactions on serum chemistry and PCB residues in shrimp (D. R. Nimmo and L. H. Bahner); Cu–Cd effects on copepod development and fecundity through the F2 generation (A. D'Agostino and C. Finney); and Zn–Pb–Hg effects alone or in double or triple combination under different thermosaline regimens on growth of a marine ciliate protozoan (J. S. Gray).

The length of the book (492 pages) is somewhat misleading: typed manuscripts were reproduced by an offset process, whereas use of conventional type would probably have shortened it by more than a third. Also, the printing of pages larger than the present 6 × 9 inches would have improved readability, particularly that of the longer tables.

It is recognized that most symposia volumes with wide subject coverage, including this one, tend to ignore or treat only cursorily many areas of interest to researchers. Nevertheless, there appears to be a need at present for subsequent volumes that continue to emphasize whole organism responses of marine teleosts, mollusks, and crustaceans to metals, petroleum hydrocarbons, and pesticides. Hopefully, these could also extend the number of species investigated to include aquatic birds, mammals, higher plants, and other groups; place greater emphasis on cellular and subcellular-responses; and broaden the range of chemical toxicants examined.

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